



# **General Certificate of Secondary Education**

## **Science A 4405 / Biology 4401**

**BL1HP**

**Unit Biology 1**

# **Mark Scheme**

*2012 examination – June series*

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the students' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of students' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

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## MARK SCHEME

### Information to Examiners

#### 1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

#### 2. Emboldening

- 2.1** In a list of acceptable answers where more than one mark is available ‘any **two** from’ is used, with the number of marks emboldened. Each of the following lines is a potential mark.
- 2.2** A bold **and** is used to indicate that both parts of the answer are required to award the mark.
- 2.3** Alternative answers acceptable for a mark are indicated by the use of **or**. (Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.)

#### 3. Marking points

##### 3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which students have provided extra responses. The general principle to be followed in such a situation is that ‘right + wrong = wrong’.

Each error/contradiction negates each correct response. So, if the number of error/contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as \* in example 1) are not penalised.

Example 1: What is the pH of an acidic solution? (1 mark)

Student	Response	Marks awarded
1	4,8	0
2	green, 5	0
3	red*, 5	1
4	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Student	Response	Marks awarded
1	Neptune, Mars, Moon	1
2	Neptune, Sun, Mars, Moon	0

### 3.2 Use of chemical symbols / formulae

If a candidate writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

### 3.3 Marking procedure for calculations

Full marks can be given for a correct numerical answer, as shown in the column 'answers', without any working shown.

However if the answer is incorrect, mark(s) can be gained by correct substitution / working and this is shown in the 'extra information' column;

### 3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

### 3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward are kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation e.c.f. in the marking scheme.

### 3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

### 3.7 Brackets

(.....) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

## **Quality of Written Communication and levels marking**

In Question 3 students are required to produce extended written material in English, and will be assessed on the quality of their written communication as well as the standard of the scientific response.

Candidates will be required to:

- use good English
- organise information clearly
- use specialist vocabulary where appropriate.

The following general criteria should be used to assign marks to a level:

### **Level 1: Basic**

- Knowledge of basic information
- Simple understanding
- The answer is poorly organised, with almost no specialist terms and their use demonstrating a general lack of understanding of their meaning, little or no detail
- The spelling, punctuation and grammar are very weak.

### **Level 2: Clear**

- Knowledge of accurate information
- Clear understanding
- The answer has some structure and organisation, use of specialist terms has been attempted but not always accurately, some detail is given
- There is reasonable accuracy in spelling, punctuation and grammar, although there may still be some errors.

### **Level 3: Detailed**

- Knowledge of accurate information appropriately contextualised
- Detailed understanding, supported by relevant evidence and examples
- Answer is coherent and in an organised, logical sequence, containing a wide range of appropriate or relevant specialist terms used accurately.
- The answer shows almost faultless spelling, punctuation and grammar.

## BL1HP

## Question 1

question	answers	extra information	mark
1 (a)	don't kill pathogens / bacteria / viruses / microbes / microorganisms	allow don't contain antibiotics ignore antibodies / attack / fight  allow <u>only</u> treat symptoms / pain ignore kill disease / germs	1
1 (b)	any <b>two</b> from: <ul style="list-style-type: none"> <li>• age</li> <li>• gender</li> <li>• extent / severity of pain <b>or</b> how long had pain <u>before</u> <u>trial</u></li> <li>• type of pain / illness / site of pain</li> <li>• (body) mass / weight / height</li> <li>• other medical issues / drugs taken / health / fitness</li> <li>• ethnicity</li> </ul>	accept 'the pain' for <b>1</b> mark, if neither extent or type given  ignore pain threshold  allow body size / physique	2
1 (c)(i)	75	ignore calculations / %	1
1 (c)(ii)	faster pain relief / decrease	allow pain relief sooner <b>or</b> it works quicker <b>or</b> more pain relief at start / in first hour / $1\frac{3}{4}$ hours	1
1 (c)(iii)	decrease of pain higher / more  decrease of pain is longer lasting	ignore more effective unless qualified by time $>1\frac{3}{4}$ hours  allow effect lasts longer	1  1

Question 1 continues on the next page . . .



## BL1HP

## Question 2

question	answers	extra information	mark
2 (a)	X respiration	correct order only allow decay / decomposition / rotting ignore breakdown / disintegrate	1
	Y combustion / burning		1
2 (b)	any <b>three</b> from: <ul style="list-style-type: none"> <li>• photosynthesise / absorb carbon dioxide</li> <li>• release carbon dioxide / respire</li> <li>• eaten by animals</li> <li>• fed on / decayed by microorganisms</li> </ul>	accept are producers <b>or</b> produce / make biomass / glucose / other named do <b>not</b> accept photosynthesis releases CO <sub>2</sub>  ignore eaten by microorganisms	3
2 (c)	any <b>two</b> from:  (in tropical rainforest conditions are) <ul style="list-style-type: none"> <li>• warm(er) / hot</li> <li>• damp / moist / wet / humid</li> <li>• a lot of microorganisms</li> <li>• a lot of material to decay</li> </ul>	ignore rain  allow warm(er) so enzymes work faster for <b>2</b> marks	2
<b>Total</b>			<b>7</b>

**BL1HP****Question 3**

<b>question</b>	<b>information</b>			<b>mark</b>
<b>3</b>	Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 2, and apply a 'best-fit' approach to the marking.			<b>6</b>
<b>0 marks</b>	<b>Level 1 (1-2 marks)</b>	<b>Level 2 (3-4 marks)</b>	<b>Level 3 (5-6 marks)</b>	
No relevant content.	There is at least one example of an adaptation of either an animal <b>or</b> a plant. However it may not be clear how the adaptation helps the organism to avoid being eaten.	There is a description of an adaptation of at least one animal <b>and</b> at least one plant. It is clear how at least one of these adaptations helps the organism to avoid being eaten.	There are clear and detailed descriptions of a range of adaptations of named animals <b>and</b> named plants. It is clear how most of these adaptations help the organisms to avoid being eaten.	
<b>examples of clear and detailed biology points made in response:</b>				
<ul style="list-style-type: none"> <li>• <b>camouflage</b> – the method of camouflage should be described plus a statement that the predator is less likely to see the prey</li> <li>• <b>mimicry / warning colouration</b> – the method should be described plus a statement that the predator is likely to confuse the prey with e.g. a poisonous organism</li> <li>• <b>thorns / prickles / spines / horns</b> – a statement that these are sharp and are likely to hurt a predator</li> <li>• <b>long limbs / streamlining</b> – a statement that these increase speed and make it more likely that prey will outrun predator</li> <li>• <b>bad taste / poison</b> – a statement that predator will find this unpleasant and 'spit out' prey / not attack same prey again</li> <li>• <b>large ears / position of eyes</b> – a statement that predators will be detected earlier so the prey can escape sooner</li> </ul>				
<b>Total</b>				<b>6</b>

**BL1HP****Question 4**

<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
<b>4 (a)</b>	any <b>two</b> control variables for <b>1</b> mark each: <ul style="list-style-type: none"> <li>• age / size of shoots</li> <li>• species <b>or</b> type of plant / seeds</li> <li>• light intensity</li> <li>• (other) named condition eg temperature / water</li> </ul>	accept amount of light / colour of light	2
<b>4 (b)</b>	ref to auxin / hormone unequal (lateral) distribution more hormone on dark side causes growth on dark side	ignore reference to phototropism	1 1 1 1
<b>4 (c)(i)</b>	(detection) in tip / top / end		1
<b>4 (c)(ii)</b>	(response) behind tip	allow at tip / end / top half	1
<b>Total</b>			<b>8</b>

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## Question 5

question	answers	extra information	mark
<b>5 (a)(i)</b>	dead / inactive / weakened	allow antigen / protein ignore ref to other components ignore small amount	1
	pathogen / bacterium / virus / microorganism	ignore germs / disease	1
<b>5 (a)(ii)</b>	white blood cells produce / release antibodies	antigen / antibiotic instead of antibody = max 2  accept lymphocytes / leucocytes / memory cells produce antibodies do <b>not</b> accept phagocytes	1
	antibodies produced quickly		1
	(these) antibodies destroy the pathogen	allow kill do <b>not</b> accept antibodies engulf pathogens	1
<b>5 (b)(i)</b>	(live) bacteria still in body	ignore numbers	1
	would reproduce	ignore mutation / growth	1
<b>5 (b)(ii)</b>	antibiotics / treatment ineffective <b>or</b> resistant pathogens survive	accept resistant out compete non-resistant	1
	these reproduce		1
	population of resistant pathogens increases	allow (resistant pathogens reproduce) rapidly	1
<b>Total</b>			<b>10</b>

**BL1HP****Question 6**

<b>question</b>	<b>answers</b>	<b>extra information</b>	<b>mark</b>
<b>6 (a)</b>	(jellyfish) gene(s) <u>cut</u> out		1
	ref to enzymes (at any stage)		1
	(gene) transferred to zebra fish at early stage of development / embryo / egg	ignore removal of zebra fish genes	1
<b>6 (b)</b>	any <b>two</b> from: <ul style="list-style-type: none"> <li>• could transfer gene to other (fish) species</li> <li>• effects on food chains</li> <li>• effects on zebra fish themselves, eg may out compete non GM zebra fish</li> </ul>	ignore unethical / religious / unnatural  accept effects on other species / humans who eat them	2
<b>Total</b>			<b>5</b>

**BL1HP**

**Question 7**

question	answers	extra information	mark
<p><b>7 (a)</b></p>	<p>in 1978 fewer finches <b>or</b> population smaller</p> <p>any <b>two</b> from:</p> <ul style="list-style-type: none"> <li>• no beaks less than 8mm</li> <li>• no beaks greater than 11.5 / 12mm</li> <li>• mean / average beak size higher</li> </ul>	<p>if these points not given allow smaller range of beak sizes for <b>1</b> mark</p>	<p>1</p> <p>2</p>
<p><b>7 (b)</b></p>	<p><u>variation</u> or <u>range</u> or <u>mutation</u> of beak sizes</p> <p>birds with larg(er) beaks are better adapted for <u>feeding</u></p> <p>birds with larg(er) beaks survive</p> <p>birds with larg(er) beaks breed <b>or</b> gene / allele for large beak passed on</p>	<p>do <b>not</b> accept idea that drought / seed size caused mutation</p> <p>accept idea of competition <u>for food</u> / <u>seeds</u> amongst finches</p> <p>accept (only / more) birds with large beaks were better competitors</p> <p>do <b>not</b> accept large beak passed on</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>
<p><b>Total</b></p>			<p><b>7</b></p>

## BL1HP

## Question 8

question	answers	extra information	mark
8 (a)(i)	0.6 or $6 \times 10^{-1}$	for correct answer  if no / incorrect answer $\frac{2.4 \times 10^4 \times 100}{4 \times 10^6}$  <b>or</b> 0.006 or $6 \times 10^{-3}$ gains <b>1</b> mark	2
8 (a)(ii)	any <b>two</b> from: <ul style="list-style-type: none"> <li>reflected</li> <li>not absorbed <b>or</b> misses chloroplasts / chlorophyll</li> <li>wrong wavelength</li> <li>photosynthesis inefficient</li> <li>allow some lost through respiration / as heat (from respiration)</li> </ul>	ignore some of light is green  allow transmitted <b>or</b> passes through leaves allow hits other plant parts  accept other limiting factors / named	2
8 (b)	energy lost via faeces / not digested / waste / excreted (of insect-eating birds)		1
	energy loss via respiration / movement / muscle contraction / heat (by insect-eating bird)	accept examples of muscle contraction do <b>not</b> accept energy used for respiration	1
	some of (insect eating) bird not eaten <u>but</u> all / most / more of insect is eaten		1
<b>Total</b>			<b>7</b>